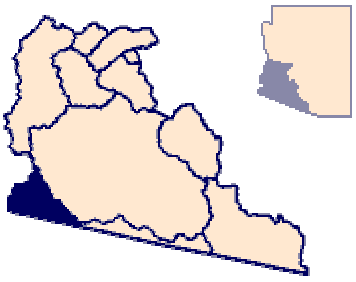
YUMA BASIN



The Yuma basin covers approximately 750 square miles of southwestern Arizona (Figure 15). It is bounded by the Gila and Laguna Mountains to the east, the Colorado and Gila Rivers to the north and west, and the Arizona-Mexico International Boundary to the south. Elevations within the basin range from 3,156 feet above mean sea level in the Gila Mountains to about 80 feet above mean sea level where the Colorado River crosses the International Boundary into Mexico.

Because of the arid conditions, no perennial streams originate in the area. The Colorado River receives most of its water from the Rocky Mountains of Colorado and is regulated by dams upstream. Historically, the Gila River was perennial; however, upstream diversions now consume the entire flow except during locally heavy rains.

The hydrogeologic setting of Yuma basin is similar to the setting described in the Parker basin. Olmsted and others (1973) divided the basin-fill into two major subdivisions based on water-bearing characteristics. The first subdivision forms the upper, principal water-producing part of the aquifer and consists of recent Colorado and Gila River alluvial deposits. Along the river valleys and Yuma Mesa, the alluvium is further divided, in descending order, into the upper fine-grained zone, the coarse-gravel zone, and the wedge zone. The coarse-gravel zone is the principal water-producing unit.

The second subdivision constitutes the lower part of the basin and includes, in descending order, the Bouse Formation, marine sedimentary rocks, volcanic rocks, and nonmarine sedimentary rocks. With the exception of the Bouse Formation and nonmarine sedimentary rocks in the northern part of the area, these highly mineralized and deep units are not considered to be significant sources of groundwater (Olmsted and others, 1973).

Regional groundwater flow is to the southwest. Most groundwater recharge comes from the Colorado and Gila Rivers and infiltration of irrigation water. Only minor amounts are contributed by precipitation and local runoff (Olmsted and others, 1973). Owen-Joyce (1987) estimated that approximately 1,000 acre-feet of groundwater enters the basin annually as underflow along the Gila River. When the Colorado River reaches flood stage, it becomes a losing stream and water begins to flow from the river to the groundwater system. In 1983-1984, large volumes of water were released from reservoirs upstream resulting in an increased river stage of 17 feet at the Yuma gage. From March, 1983, to September, 1983, groundwater levels within 2,000 feet of the river rose 8 to 13 feet (Mock and others, 1988). Groundwater levels locally are controlled by the use of imported water, drainage ditches, and pumpage for irrigation and drainage (U.S. Bureau of Reclamation, 1990). Depth to groundwater in 1988 ranged from less than two to over 500 feet below land surface but, in general, is less than 20 feet below land surface in agricultural areas (U.S. Bureau of Reclamation, 1990).

The Algodones Fault trends northwest to southeast across the basin south of Yuma. The fault provides a barrier to groundwater movement which is evident by significant differences in water-level altitudes on each side of the fault. Water-level altitudes from 1988 on the northeast side of the fault are as much as 40 or more feet higher than on the southwest side (U.S. Bureau of Reclamation, 1990).

An estimated 49 million acre-feet of groundwater are in storage in the basin to a depth of 1,200 feet and approximately 226,000 acre-feet were withdrawn in 1984 (U.S. Geological Survey, 1986). Some of the groundwater was pumped to control rising water levels caused by irrigation and associated practices.

Water quality varies with depth and location. Total dissolved solids content in 1988 ranged from less than 1,000 to 4,000 milligrams per liter (U.S. Bureau of Reclamation, 1990). Extensive groundwater contamination by agricultural pesticides and nitrates exists in the Yuma area (Arizona Department of Environmental Quality, 1990). Volatile organic compound contamination has been reported at the Yuma Marine Corps Air Station.